

## **ROTARY ATOMIZER WITH BLOCKABLE SHAFT**

### **CROSS-REFERENCE TO RELATED APPLICATIONS**

[00001] This application claims the benefit of United States Patent Application Serial No. 10/256,428, filed September 27, 2002, and German Patent  
5 Application No. 15412DE, filed March 29, 2001.

### **FIELD OF THE INVENTION**

[00002] The present invention relates generally toward a rotary atomizer, and more particularly toward a rotary atomizer for a coating device.  
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### **BACKGROUND OF THE INVENTION**

[00003] In production paint settings, paint is applied to a workpiece using a rotary atomizer having an atomizer bell that spins at high speeds to atomize the paint being applied to the workpiece. This type of paint application device, in combination  
15 with generating an electrostatic field, has produced high quality paint finishes along with high paint transfer efficiencies. Generally, an atomizer bell is affixed to a rotating shaft that transfers rotational movement at high speed to the atomizer bell. A shaft receives rotational movement from a turbine or equivalent motor transferred through gears as is known in United States Patent No. 5,816,508.

20 [00004] The rotating shaft and related drive mechanisms are generally concealed inside an atomizer housing where the shaft includes a distal end extending outwardly onto which the atomizer bell is affixed. As part of general production maintenance, the atomizer bell is typically removed from the assembly for cleaning or replacement with a new atomizer bell. This has generally been difficult to perform

because the rotating shaft does not allow for the easy removal of the atomizer bell from the assembly.

[00005] United States Patent No. 5,816,508 discloses one method of securing a rotatable shaft by affixing a push pin locking device to the housing of the atomizer. However, the drive mechanism of the disclosed rotary atomizer is quite complex requiring several gears to translate rotational movement to the atomizer bell. Therefore, it would be desirable to provide a compact simplified turbine design eliminating gear mechanisms while still providing the ability to lock the rotating shaft for easy removal of the atomizer bell.

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### **SUMMARY OF THE INVENTION**

[00006] A rotary atomizer assembly for applying paint to a workpiece includes a housing and an atomizer bell extending from the housing for atomizing paint being applied to the workpiece. A turbine is disposed within the housing and provides a bearing surface for a rotary shaft that the atomizer bell is affixed to. The rotary shaft is rotatably supported by the bearing surface and is coaxially aligned with the turbine. The shaft defines a distal end adapted to receive the atomizer bell and a proximal end adapted to be received by the turbine. A locking element is received by the turbine and extends through the housing. The locking element is moveable radially inwardly toward the rotary shaft and is engageable with the rotary shaft for locking the rotary shaft in a non-rotatable position.

[00007] The simplified design of the turbine and rotary shaft solves the problems associated with prior art rotary atomizer assemblies, which require independent gear mechanisms to drive the rotary shaft. The elimination of the gearing mechanisms reduces significantly the number of components necessary to rotate the atomizer bell at

a high speed. Furthermore, a locking element now is capable of locking the rotary shaft to the turbine, which provides rotational movement to the rotary shaft enabling the atomizer bell to be easily removed from the assembly.

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**BRIEF DESCRIPTION OF THE DRAWINGS**

[00008] Figure 1 shows a rotary atomizer assembly of the present invention;

[00009] Figure 2 shows a partial sectional view of the rotary atomizer of the present invention;

10 [00010] Figure 3 shows an exploded view of the rotary atomizer of the present invention;

[00011] Figure 4 shows a partial perspective view of the turbine associated with the rotary atomizer; and

[00012] Figures 5A through 5C show a sequential movement of the locking  
15 element engaging the rotary shaft and the turbine.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

[00013] Figure 1 shows a perspective view of the inventive atomizer assembly generally shown at 10. A housing 12 encloses the working components of the  
20 assembly 10 to protect the components from contaminants such as, for example, cleaning solvents and atomized paint. An atomizer bell 14 extends from the housing 12 and rotates at a high speed to atomize paint as will be explained further below. A button 16 is disposed in the housing 12 and provides a depression surface, the purpose of which will also be explained further below. Referring now to Figure 2, a mounting member 18  
25 is disposed inside the housing 12 and provides a mounting surface into which a turbine

20 is received. A retainer 22 is threaded onto the mounting member 18 over the turbine 20 to secure the turbine 20 inside the housing 12. A rotary shaft 24 is rotatably supported within the turbine 20 on bearing surface 26.

5           **[00014]**           The rotary shaft 24 is coaxially aligned within the turbine 20 along axis A. The rotary shaft 24 includes a distal end 28 and a proximal end 30. The distal end 28 is adapted to receive the atomizer bell 14 in a fixed relationship. More specifically, the rotary shaft 24 defines a threaded surface 32 onto which the atomizer bell 14 is threadably received securing the atomizer bell 14 to the rotary shaft 24.

10           **[00015]**           Turbine blades 34 circumscribe the rotary shaft 24 proximate the proximal end 30 of the rotary shaft 24. The turbine 20 defines an aperture 36, best shown in Figure 4, fluidly cooperable with the turbine blades 34 to provide rotational movement to the rotary shaft 24 as is known to those of skill in the art of turbine motors. More than one aperture 36 may be included to provide varying degrees of rotational movement to the rotary shaft 24. The turbine blades 34 are completely concealed inside the turbine 20  
15 by an end plate 38.

**[00016]**           A locking element 40 is received by the turbine 20 for securing the rotary shaft 24 in a non-rotatable position. The locking element 40 is actuated by depressing the button 16 disposed in the housing 12, which moves the locking element 40 radially inwardly to engage the rotary shaft 24 and the end plate 38 of the turbine 20.  
20           A spring element 42 biases the locking element 40 radially outwardly from the axis A allowing the rotary shaft 24 to rotate freely inside the turbine 20.

**[00017]**           As best shown in Figure 4, the end plate 38 of the turbine 20 defines a slot 44 with an end cap 46 through which the locking element 40 is slideably disposed. The proximal end 30 defines receptors 48 that receive the locking element 40  
25 to secure the rotary shaft 24 in the non-rotatable position. The notch 44 disposed in the

end plate 38 of the turbine 20 provides an abutment for the locking element 40 to secure the rotary shaft 24 in the non-rotatable position.

[00018] Referring to Figures 5A through 5C, the locking element 40 is shown in the neutral position (Figure 5A) and the locking position (Figure 5C). A cluster of feed lines 50 is concentrically disposed within the rotary shaft 24 for providing paint and cleaning fluids to the atomizer bell 14. However, the rotary shaft 24 rotates freely around the feed line cluster 50, which is immobile relative to the atomizer bell 14 and the rotary shaft 24. As shown in Figure 5A, moving the locking element 40 radially inwardly does not engage the receptors disposed in the turbine 20 as the receptors 48 are not aligned with the locking element 40. As shown in Figure 4B, by rotating the rotary shaft 24, the receptors 48 are easily aligned with the locking element 40 enabling the locking element to be moved from the neutral position as shown in Figure 5A to the locking position as shown in Figure 5C thereby preventing the rotary shaft 24 from rotating. Once the locking element 40 has been moved to the locking position, the atomizer bell 14 is easily removed by unscrewing the atomizer bell 14 from the rotary shaft 24.

[00019] The invention has been described in an illustrative manner, and it is to be understood that the terminology which has been used is intended to be in the nature of words of description rather than of limitation.

[00020] Obviously, many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, wherein reference numerals are merely for convenience and are not to be in any way limiting, the invention may be practiced otherwise than as specifically described.